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## Elementary Teachers' Use of Technology

by Dan Laitsch

### The Question

How do elementary teachers use technology in the classroom, and what teacher, school, and district characteristics best support appropriate use of education technology?

### The Context

Educators have long sought to use technology in classrooms, both to improve the delivery of curriculum content and provide training in the skills students need to enter the modern workforce. Technology also plays a critical role in noninstructional activities, including data management, lesson preparation, and communication. Some state programs, most notably Maine's [Learning Technology Initiative](#), have worked to provide laptop computers to entire classes of students. Nationwide, student-to-computer ratios have dropped to one computer for every four students. Through the [E-rate](#) program, (the Schools and Libraries Universal Service support mechanism), more than \$5.8 billion has been devoted to connecting schools—public and private—and libraries to the Internet. Despite the broad range of access to and use of technology for instruction, study, and data management, however, questions remain about the ability of educators and students to use these resources effectively. As technology use becomes ubiquitous, educators are beginning to shift their focus from how to get technology to how best to support its appropriate use.

### The Details

Laura M. O'Dwyer, Michael Russell, and Damian J. Bebell conducted the study highlighted in this issue of *ResearchBrief* (see for full citation). Using data collected in the spring of 2002 through Boston College's [Use, Support, and Effect of Instructional Technology Study](#), the researchers employed hierarchical linear modeling to examine technology issues at the classroom and district level. The data sources for this study included USEIT survey responses from 1,490 elementary teachers (excluding special education teachers) in 96 schools covering grades K–6. The vast majority (96 percent) of teachers had some type of access to computers, with 86 percent reporting access to desktop computers in their classrooms.

One of the questions any researcher examining technology issues faces is how to define “technology.” Education technology can include anything from telephones, photocopy machines, film strip projectors, and overhead projectors to video cameras, televisions,

computers, or even electron microscopes. The study discussed here did not attempt to define every piece of technological equipment a teacher might use; rather, the survey included questions relating to specific pieces of technology (particularly computers), as well as less restrictive questions focusing on student opportunities to use undefined technology in their coursework. The researchers used the data culled from this survey to examine four primary uses of technology:

- Teacher use for delivering instruction.
- Student use, under teacher direction, during class time.
- Student use, under teacher direction, to create products.
- Teacher use for class preparation.

Although considered separately, the items were highly correlated. In general, teachers used technology most frequently for preparation, and least frequently for having students create products.

O'Dywer, Russell, and Bebell used hierarchical analysis to examine the variability in technology use within and between schools and districts. Teacher variables used in this analysis included

- Grade level
- Number of years teaching
- Access to technology
- Professional development
- Perceived need for technology-focused professional development
- Incentives and pressure to use technology
- Level of technology support
- Pedagogical beliefs
- Comfort level using technology
- Beliefs in the efficacy of technology

These teacher-level measures were then aggregated to create school-level measures. In addition, an indicator of socioeconomic status was created to analyze how poverty issues contributed to variance between schools.

Not surprisingly, the researchers found that the availability of technology was positively related to its use, both by students during class time and by teachers for preparation. Perhaps also unsurprising, when teachers felt pressured to use technology, they were more likely to use it across all four areas examined by the survey: in the delivery of instruction, with students during class time and for the creation of products, and in lesson preparation.

At the individual teacher level, however, teachers were less likely to use technology across the board if they had previously experienced problems integrating technology into the curriculum. The quality of technology available and the characteristics of his or her students had negligible effects on a teacher's decision to use technology in the classroom. The strongest predictor of

teacher use of technology for all four areas was the strength of their belief that technology use stimulates positive outcomes for students, although the strength of this belief did not predict their own technology use. Teachers with stronger constructivist pedagogical beliefs were also more likely to have students use technology in the classroom. When teachers perceived that professional development was inadequate, they were less likely to use technology to deliver instruction and prepare for class.

Although very little of the variance within individual schools was explained by the models constructed by the researchers (less than 10 percent), a great deal of the between-school variance was predicted, particularly in the areas of funding, access to technology, adequate professional development, and school-level pressure to use technology. Interestingly, socioeconomic status had no effect on technology-use difference between schools.

## **The Bottom Line**

Teachers are much more likely to use technology to deliver instruction, to provide opportunities for student use of technology, and for planning purposes when they teach in schools and districts that emphasize professional development around technology integration, pressure teachers to use technology, ensure availability of and access to technology, and limit the amount of restrictive policies relating to technology use.

## **Who's Affected?**

This study focused on elementary-level teachers, schools, and districts in Massachusetts.

## **Caveats**

All of the data in this study comes from one state and is based on teacher self-reporting. Differences between states in their approach to technology use and integration in classrooms may make it difficult to generalize the findings of this study to educational settings outside of Massachusetts. Fifty-eight percent of the teachers making up the data set had been teaching for more than 10 years, which may account for some of the importance attributed to professional development, because initial teacher preparation for many of the teachers occurred before much of today's computer technology was integrated into schools and teacher preparation programs. In addition, although the study refers in general terms to "technology," the overwhelming emphasis was on computer use and nonspecific technologies, making it difficult to apply the findings to the broad range of technology found in schools. Even though many of the results were statistically significant, only a small amount of the variance in use was explained by the models—therefore, it may be that much of the variability in use is due to factors outside of school control (such as student age, prior use of technology by teachers, and teacher preparation). Finally, although the study focused on technology use, the researchers did not look at how it was used or the effectiveness of that use.

## **The Study**

O'Dwyer, L. M., Russell, M., & Bebell, D. J. (2004, September 14). [Identifying teacher, school and district characteristics associated with elementary teachers' use of technology: A](#)

[multilevel perspective](#). *Education Policy Analysis Archives*, 12(48).

## Other Resources

[International Society for Technology in Education](#)

[National Educational Technology Standards Project](#)

[Maine Learning Technology Initiative](#)

[Teachers and Technology: Turning the Corner on Teaching](#)

Curriculum Update

[Australasian Journal of Educational Technology](#)

[Journal of Special Education Technology](#)

[Journal of Technology Education](#)

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